

REMARKS

In response to the Official Action of February 9, 2005, claims 1 and 13 have been amended in a manner which is believed to distinguish these claims over the cited art and, as a result, it is respectfully submitted that claims 1-29 as currently presented are also distinguished over the cited art. The specification has been slightly amended and a replacement Figure 3 is presented as explained more fully below.

During a review of the application for preparation of the present amendment, it was noted that there is a minor error in the specification at page 10, line 29 which has been corrected herein. Furthermore, it has been noticed that with regard to Figure 3, the recited steps have reference numerals recited at page 13, lines 10-29 but that these reference numerals are not shown in Figure 3. A proposed replacement sheet for Figure 3 is hereby presented, as well as amendment to the specification at page 13 with regard to the recited steps to include the word "step" in association with reference numerals 20, 22, 24, 26 and 28. No new matter is presented in the amendment to the specification and figures since the originally filed specification and figures make clear that Figure 3 is a depiction of the method according to the invention and that the recited language therein represent the steps of that method as clearly set forth in the originally presented specification at page 13, lines 10-31.

More particularly with regard to paragraph 2 of the Official Action, claims 1-29 are rejected under 35 U.S.C. §102(b) as anticipated in view of US patent 5,966,020, Rampone et al (hereinafter Rampone).

As noted by the Examiner, Rampone is directed to a method and apparatus for facilitating detection of solder opens of surface mount technology (SMT) components. As shown in Figures 4A and 5, Rampone uses a plurality of split mounting pads 260₁, 260₂...269₁, 269₂ which are associated with corresponding solder joints 290₁, 290₂...299₁, 299₂ so that the corresponding electrical contacts to which the split mount pads are electrically connected can be tested as set forth at column 6, lines 18-43. For example, Figure 7 shows the electrical current path from first

probe 400 to second probe 420 so as to test the solder joint associated with the joint comprising 290₁ through 291₂. It is therefore clear in Rampone that the split mounting pad facilitates electrical testing of an interconnection between a single electrical contact of a SMT component and a printed circuit board.

As seen in Figure 7, when testing the connection according to the method disclosed in Rampone, the test current and voltage passes through and onto electrical contact 410 which in turn makes electrical contact with the integrated circuit placed within the SMT socket 250. Thus, testing can only be carried out in a safe manner when the integrated circuit is not mounted within the SMT socket.

Furthermore, according to Rampone, the pads and solder joints are used both for electrically connecting the printed wiring board with the SMT socket, as well as for testing the connection therebetween. This combination may cause damage to an integrated circuit during testing if it is within the SMT socket, such as if the test voltage or test current is greater than that for which the integrated circuit is rated.

In contrast, the present invention as claimed provides the testing of the connection between the integrated circuit and the printed wiring board directly through mechanical coupling support elements 10a, 10b, 10c as seen in Figure 1 of the present application and whose various patterns are shown in Figures 2a-2c. The mechanical coupling through the support elements may be achieved by solder balls whereas the electrical coupling between the integrated circuit and the circuit board can be achieved by use of a ball grid array 18 (see Figures 2a-2c).

Furthermore, in contrast to Rampone, the present invention provides testing of connections between the printed wiring board and the integrated circuit package by using mechanical connection elements which only provide mechanical coupling between the printed wiring board and the integrated circuit package. This is clearly seen in Figure 1, as well as Figures 2a-2c. The electrical coupling elements, such as the ball grid array 18, are not used for testing the connection and therefore test currents are not applied to the electrically connected coupling elements and are not applied to the integrated circuit package. In short, the present

invention uses the testing of the mechanical connection elements in order to be able to analyze the connection conditions between the integrated circuit package and a circuit board. This clear distinction of the present invention over the prior art is now particularly pointed out and claimed in amended claims 1 and 13.

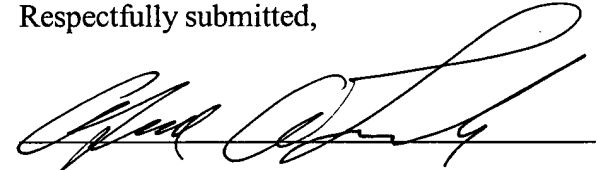
With respect to amended claim 1, it is specifically pointed out and claimed that the support elements are electrically connected to each other on one side of the integrated circuit package. These support elements are defined as the elements which mechanically connect the integrated circuit package to the circuit board but are not the coupling elements that electrically couple the integrated circuit package to the circuit board. The remainder of claim 1 recites that physical values are picked-off from the support elements and that the physical values are evaluated to determine the condition of the connection between the integrated circuit package and the circuit board. Rampone does not in any manner disclose or suggest support elements associated with mechanical connection of an integrated circuit package to the circuit board for determining the condition of the electrical connection between the integrated circuit package and the circuit board. Rather, Rampone is strictly directed to testing solder joints between electrical contacts used for making electrical contact with an integrated circuit and a printed circuit board. It is therefore respectfully submitted that amended method claim 1 is neither anticipated nor suggested by Rampone.

Independent system claim 13 has been amended in a manner similar to that of method claim 1 and for similar reasons is believed to be neither anticipated nor suggested by Rampone.

Since independent method claim 1 is believed to be distinguished over Rampone, it is respectfully submitted that dependent claims 2-12 and 28-29, which all ultimately depend from method claim 1, are also distinguished over Rampone. Similarly, since independent system claim 13 is believed to be distinguished over Rampone, it is respectfully submitted that dependent system claims 14-26, and consumer electronic device claim 27 are also distinguished over Rampone.

In view of the foregoing, it is respectfully submitted that the present application as amended is in condition for allowance and such action is earnestly solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Alfred A. Fressola', written over a horizontal line.

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